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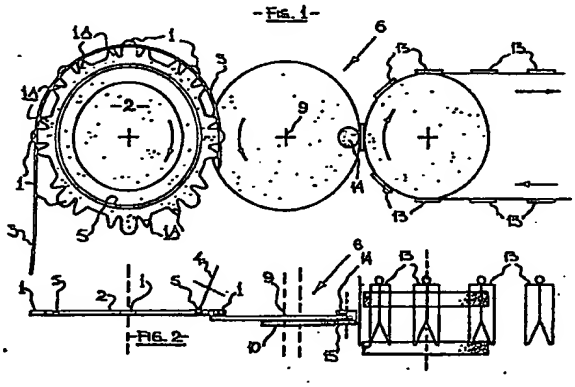
(54) Automatic transfer apparatus.

(57) Apparatus for transferring slaughtered birds such as chickens, ducks, turkeys, etc. from one overhead chain conveyor to another. The apparatus includes a rotary hock cutter (2) and a rotary transfer table (6) which incorporates a mechanism enabling it to function as an eccentric wheel (10) having a plurality of knuckle-receiving notches (8) about its periphery. The mechanism continuously varies the spacings between the notches as the transfer rotates. Thus, bird carcasses received by the transfer table at a first spacing are enabled to be delivered to such as an overhead chain conveyor at a second spacing.



EP 0 235 106 A1

Description

TECHNICAL FIELD

THIS INVENTION relates to poultry processing plant and more particularly to apparatus for transferring slaughtered birds from a first overhead chain conveyor to another such.

BACKGROUND ART

Since the processing of meat birds (such as chickens, end-of-lay hens, spent breeding stock, ducks and turkeys) has been to any degree automated, it has been the practice to suspend the live birds head downwards by slotting their feet into shackles depending from an overhead chain conveyor. This conveyor moves the birds through a stunning station, a killing station, a bleeding station, a scalding station, a defeathering station and finally a de-hocking station where the legs of the slaughtered birds are severed at the knee joint by means of a rotating hock-cutter.

The dehocking operation resulted in the birds - now without lower legs - falling onto a table, chute or conveyor belt for eventual manual re-hanging on an overhead chain conveyor for subsequent eviscerating.

Disadvantages of the above-described process include:-possible cross-contamination of carcasses as they lay heaped in the receptacle awaiting re-hanging; the chance of repetitive strain injuries to operators who have to lift the birds and force them into the eviscerating shackles; this (particularly with such as large turkeys which may weigh 20 kg or more); and the cost of labour of the process.

Health laws in most developed countries now require separate conveyor systems to be used for slaughtering and eviscerating. Moreover, some real advantages accrue from having such a non-continuous conveyor arrangement, with its higher efficiency, as will be realised hereinafter.

While automatic re-hang apparatus' are in production, at the present time they are confined to devices for the transfer of birds between overhead chain conveyors having equal shackle spacings. The shackles which carry the birds can be hooked to the conveyor chains at various spacings, say, 4", 6", 8", 10", 12", etc., and optimum spacing is determined not only by the size of the bird but also by purpose. For example, in the case of chickens, 8" spacing is advantageous for efficient defeathering; on the other hand, 6" spacing might well be required for the eviscerating process. Then again, turkeys may need a reduction of from about 12" to 10" or 8".

DISCLOSURE OF INVENTION

The above and other disadvantages are overcome, according to the present invention, by an automatic rehang device having the ability to transfer birds between conveyors with different shackle spacings. Furthermore, and in a second aspect, the inventive device has the advantage of being able to transfer birds from one slaughtering/defeathering conveyor to two eviscerating conveyors.

In yet another aspect, the inventive device is of use in the transferring birds from an eviscerating conveyor to a chilling or air-cooling conveyor. With respect to the first aspect capability, whereas it is possible to operate a slaughtering and defeathering conveyor at, say, 14,000 birds per hour, the eviscerating conveyor speed is limited by the capacities of the machines associated with it and the physical ability of the operators working the line to perform their manual tasks with the birds moving rapidly by. At a certain line rate it is impossible for the operators even to look at the interior of each carcass as it passes. Thus, according to the present invention, there is provided automatic re-hang apparatus for a poultry processing plant, the said apparatus comprising a rotary hock cutter; a rotary transfer table; and an eviscerating shackle guide; the rotary transfer table including mechanism enabling it to function as an eccentric wheel provided with a plurality of knuckle-receiving notches, the peripheral spacing of which is continuously variable as the table rotates, whereby carcasses received by the transfer table from the hock cutter at a first spacing are enabled to be delivered to at least one eviscerating overhead chain conveyor at a second spacing.

The invention also resides in automatic re-hang apparatus for a poultry processing plant, the said apparatus comprising a first overhead chain conveyor a rotary transfer table; and a second overhead chain conveyor; the rotary transfer table including mechanism enabling it to function as an eccentric wheel provided with a plurality of knuckle-receiving notches, the peripheral spacing of which is continuously variable as the table rotates, whereby carcasses received by the transfer table from the first overhead chain conveyor at a first spacing are enabled to be delivered to said second overhead chain conveyor at a second spacing.

BRIEF DESCRIPTION OF DRAWINGS

In order that the reader may gain a better understanding of the present invention, hereinafter are described certain embodiments thereof, by way of example only and with reference to the accompanying drawings in which:-

FIGURE 1 is a schematic top plan view of an apparatus according to the present invention;

FIGURE 2 is a corresponding side elevation;

FIGURES 3, 4 and 5 show, in greater detail, an inventive rotary transfer table; and

FIGURE 6 shows an alternative rotary hock cutter.

MODES FOR CARRYING OUT THE INVENTION

Slaughtered and defeathered birds are conveyed by an overhead conveyor chain towards the inventive re-hang apparatus. As they approach, hung in killing shackles, lugs 1 on rotary hock cutter 2 ensure that each carcass is guided into the correct position on the perimeter of the cutter for accurate hock cutting and transfer.

Ancillary lugs 1A between lugs 1 prevent displacement of the carcass legs. Guide members, as 3, above and below hock cutter 2 bend the leg of the bird at the joint between the lower leg and the drumstick so as to present the joint accurately to a circular saw blade 4 which severs the leg at the joint. This blade is driven by an electric motor gearbox unit (not shown); the guide bars and the blade are all positionally adjustable so that optimum efficiency can be achieved. Blade 4 co-acts with an annular cutting groove 5 in hock cutter 2.

When the legs have been severed, the bird is freed from its killing shackle and, no longer held against hock cutter 3 by guide members 3, falls away. However, the knuckles are engaged with a series of notches in the periphery of rotary transfer table means, generally referenced 6, to prevent the bird from falling further, and guide members 3 prevent the knuckles from slipping out of the notches. Both upper and lower guide members, as referenced 3, are shaped to conform with the operational perimeter of hock cutter 2 and are of a length to retain the bird until the transfer point is reached. The lower guide member is ideally fabricated from stainless steel pipe drilled at close intervals along the top so that water introduced into the pipe will spray out of the holes. This provides lubrication between the guide member and the parts of the bird in sliding contact with it, thus preventing damage to the skin of the "drumstick".

Considering now the rotary transfer table 6, its working perimeter is composed of a plurality of sectors 7, each of which is provided with a pair of notches 8 which conforms to the spacing between suspension points on the shackles. (See Figure 5). Each sector 7 is of generally triangular configuration and the pieces of all eight sectors are pivoted about a common pivot-point 9. The rotary movement of the ring of sectors 7 is brought about via a driven rotary pin-bearing wheel or plate 10. Plate 10 bears an array of equidistantly-spaced, upstanding pins 11, each one of which slides in a longitudinal slot, as that referenced 12, in a sector 7. Thus, as pin-bearing plate 10 rotates, the spacing between adjacent sectors constantly varies so as to enable the transfer table to be loaded from the hock cutter at one spacing and to be discharged to the eviscerating shackles at another. Rotary transfer table means 6 can be arranged to suit the shackle spacings required; the most usual application will be to transfer from the killing conveyor at 8" centres to the eviscerating conveyor at 6" centres.

At the transfer point, a pressure wheel 14 bears on the knuckle at the point where it protrudes through transfer table 6 and gently eases it out of its notch and into the suspension point on an eviscerating shackle 13 aligned with the notch.

A second pressure wheel 15 is located beneath rotary transfer table 6 and exerts additionl pressure on the drumstick in the suspension point of eviscerating shackle 13 to force it down even further and more firmly into the shackle.

The bird, thus suspended from an eviscerating conveyor shackle 13, is then conveyed away.

In a further aspect of the present invention, one killing/defeathering line may service two eviscerating lines by the installation in the poultry processing plant of a pair of the inventive automatic re-hang apparatus.

The killing/defeathering overhead chain conveyor runs about a hock cutter, generally referenced 16, shown in Figure 6, adapted to allow each second bird to be kept away from, and out of contact with, the circular blade 4. This is achieved by providing a number of bights 17 in the periphery of the hock cutter so as to allow a bird to hang freely, out of contact with the guide member arrangement which would otherwise present the bird for hock-cutting.

Thus, the birds cut from the killing/defeathering conveyor will be at double the shackle spacing on the killing line. Rotary transfer table 6 is therefore set up to load the carcasses at this spacing and to reduce the spacing so that of the eviscerating line before discharge.

The birds remaining on the killing/defeathering line are then presented to the hock cutter of the second automatic re-hang apparatus which cuts them off the line and loads them on the transfer table which, in turn, once again has to be set up to accordingly reduce the shackle spacing.

In this manner the birds are evenly distributed between the two eviscerating lines.

It will be understood that the rotary hock cutter and the rotary transfer table are linked together mechanically to synchronise their functions, while the eviscerating shackle guide is synchronised with the first two components either mechanically or electronically. If this linkage is mechanical a disengaging clutch is incorporated, as the overhead eviscerating chain conveyor should be capable of being operated independently of the killing/defeathering chain conveyor.

It will be realised that each chain conveyor sprocket is provided with conventional capturing lugs about its periphery to catch and hold firm the suspended shackles during unloading and transfer operations.

For the reasons outlined earlier, i.e. health, operator strain, and labour saving, the device can also be used in other parts of the poultry processing plant to transfer birds from one conveyor to another, as under:-

EVISCERATING LINE TO AIR COOLING LINE

In some parts of the world, birds are chilled after evisceration by placing them in a refrigerated room where they are subjected to currents of cold air to reduce the carcass temperature as quickly as possible.

In the less automated plants, the birds are manually hung on mobile racks, and wheeled into the room where they remain for a prescribed period.

Alternatively, an overhead conveyor system can be constructed inside the room. The length of the overhead conveyor and the number of suspension shackles fitted to the conveyor inside the room is determined by the line speed (i.e. birds per hour) and the length of time required to chill the birds. For example, if the plant is operating at 6,000 per hour, and one hour is required to chill the birds, the

conveyor inside the room must be capable of suspending 6,000 birds.

Thus it is a real advantage to be able to transfer automatically from the eviscerating line direct to the air cooling line.

The eviscerating line shackles are caught, steadied and held firmly by a first sprocket wheel.

The birds are unloaded from the eviscerating shackles by an angled bar which forces the legs up and out of the shackles.

One leg is allowed to fall free, and the other is forced into the notch in the rotary transfer table.

The birds continue around the transfer table, which is substantially the same as that used for the killing/eviscerating transfer process, except that it is only necessary to suspend the birds by one leg. Shackle spacing is different, as the air cooling line constructed with the birds hanging fairly close - the further apart they are the bigger the room required. So it would be possible to transfer from the eviscerating line to 6 inch centres to the air cooling line at 3 or 4 inch centres.

At the other end of the transfer table, the birds are forced out of the notches and into the shackles of the air cooling line, these shackles being caught and held firm to present the 'V' of the shackle accurately to the notch of the transfer table in every case.

AIR COOLING LINE TO GRADING/SIZING LINE

Most poultry processing plants use an overhead conveyor system fitted with a mechanical or computerised weighing device to distribute birds by size and/or quantity throughout the packing and further processing areas of the plant.

The birds are manually hung by one leg on special shackles fitted to the grading line. On lines with computer control, the shackles carrying the birds pass over a weighcell which transmits the data back to a computer. The computer is programmed to distribute the birds by size and/or number at various stations around the plant, and signals are sent to the various drop-off stations to activate an air cylinder which loads the shackle at that point.

On lines with mechanical weighing devices, the birds are selected by weight as they pass the various unloading stations, where the shackles are unloaded thus releasing the bird to fall into a bin or whatever.

Most computerised grading lines operate at 8 inch centres, as it is important that the birds hang freely without touching each other for greater accuracy at the weighcell.

The air cooling line is at smaller shackle spacings for the reasons mentioned earlier.

Therefore, automatic transfer between the two lines is a real advantage, and can be achieved with this invention.

In a similar manner to the operation of the eviscerating line to air cooling line transfer, the air cooling line shackles are caught and steadied, and the bird, suspended by only one leg, is transferred.

From the abovegoing it will be readily appreciated by those skilled in the art that numerous other variations and modifications may be made to the invention without departing from the spirit and scope thereof as set out in the following claims.

Claims

1. Automatic re-hang apparatus for a poultry processing plant, said apparatus comprising a rotary hock cutter; a rotary transfer table; and an eviscerating shackle guide: characterised in that said rotary transfer table includes mechanism enabling it to function as an eccentric wheel provided with a plurality of knuckle-receiving notches, the peripheral spacing of which is continuously variable as said transfer table rotates, whereby carcasses received by said transfer table at a first spacing are enabled to be delivered to at least one eviscerating overhead chain conveyor at a second spacing.

2. Automatic re-hang apparatus for a poultry processing plant, said apparatus comprising a first overhead chain conveyor; a rotary transfer table; and a second overhead chain conveyor; characterised in that said rotary transfer table includes mechanism enabling it to function as an eccentric wheel provided with a plurality of knuckle-receiving notches, the peripheral spacing of which is continuously variable as said transfer table rotates, whereby carcasses received by said transfer table from said first overhead chain conveyor at a first spacing are enabled to be delivered to said second overhead chain conveyor at a second spacing.

3. In automatic re-hang apparatus for a poultry processing plant, a rotary transfer table characterised in that it includes mechanism enabling it to function as an eccentric wheel having a plurality of knuckle-receiving notches, the peripheral spacing of which is continuously variable as said transfer table rotates, whereby carcasses received by the said transfer table at a first spacing are enabled to be delivered at a second spacing.

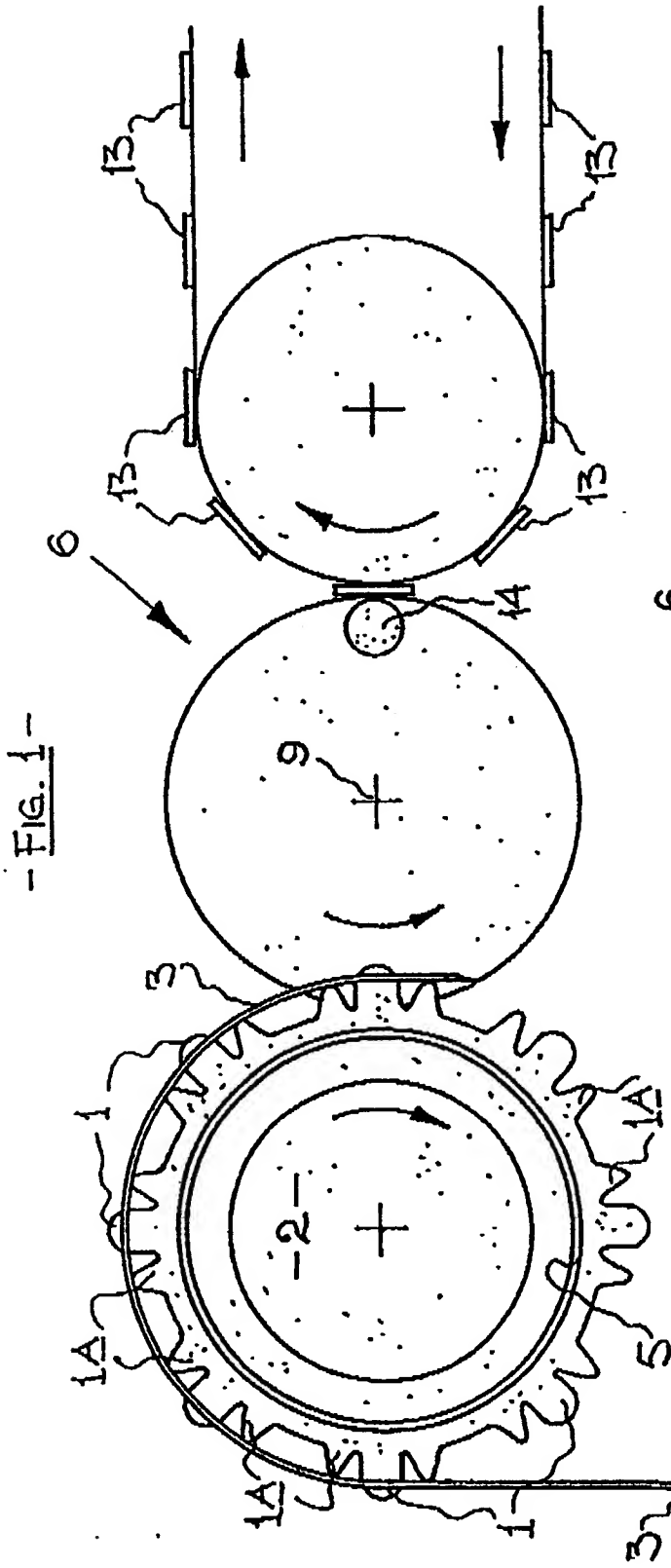
4. Automatic re-hang apparatus as claimed in Claim 1 or Claim 2, wherein said rotary transfer table comprises a plurality of triangular sections and a driven wheel bearing about its periphery an equal plurality of equidistantly-spaced, upstanding pins; apices of the said sectors being pivoted about a common pivot point on said wheel, spaced apart from the axis of rotation thereof and having, in each sector side remote from said pivot point, a pair of the said knuckle-receiving notches; each sector being provided with a longitudinal slot in which a said pin is slidable as said wheel rotates.

5. The rotary transfer table as claimed in Claim 3, wherein the said table comprises of plurality of triangular sections and a driven wheel bearing about its periphery an equal plurality of equidistantly-spaced, upstanding pins; apices of the said sectors being pivoted about a common pivot point on said wheel, spaced apart from the axis of rotation thereof and having, in each sector side remote from said pivot point, a pair of the said knuckle-re-

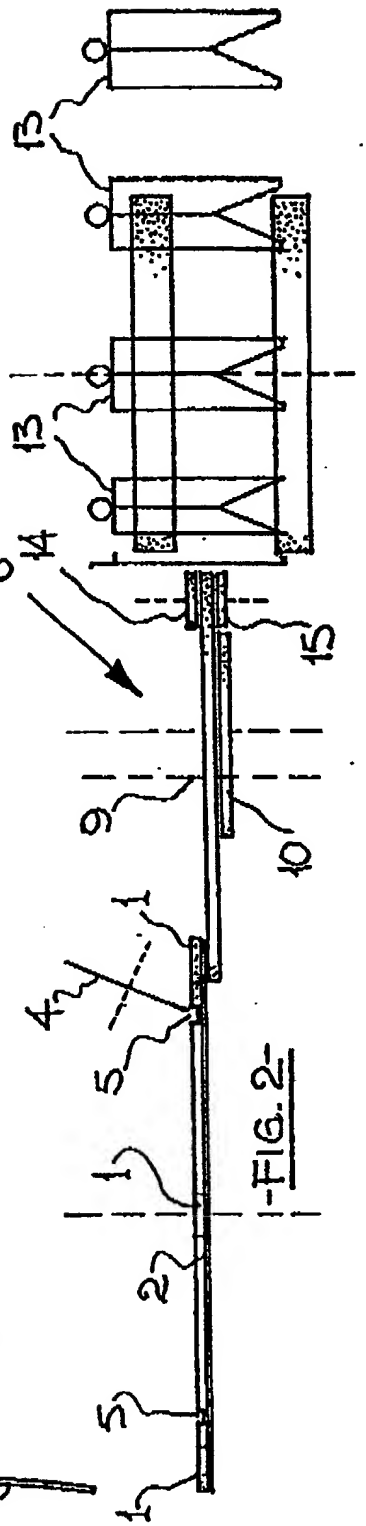
ceiving notches; each sector being provided with a longitudinal slot in which a said pin is slidable as said wheel rotates.

6. Automatic re-hang apparatus as claimed in any one of Claims 1, 3, 4 or 5, wherein said rotary hock cutter is provided with equidistantly-spaced peripheral lugs adapted to correctly position defeathered carcasses for feeding to a circular cutting blade associated with the said rotary hock cutter.

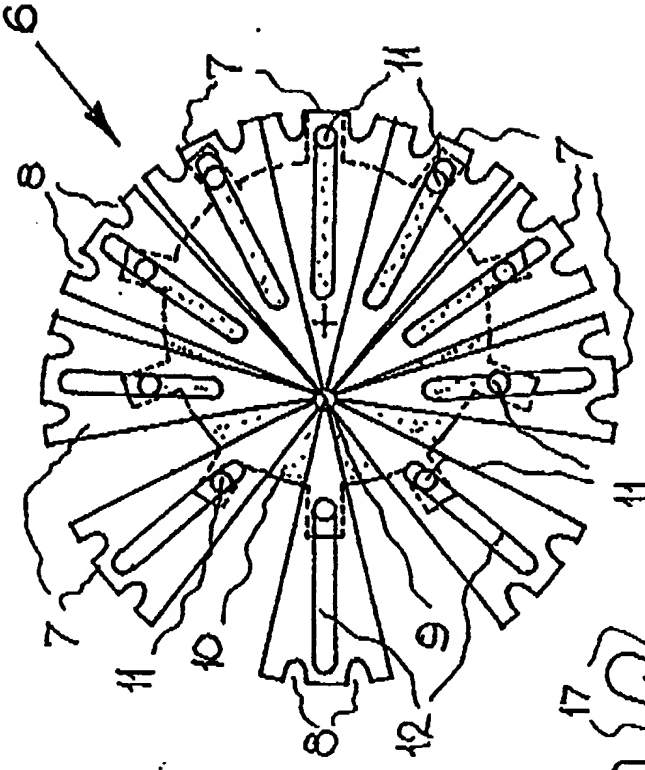
7. Automatic re-hang apparatus for a poultry processing plant, substantially as hereinbefore described with reference to the accompanying drawings.



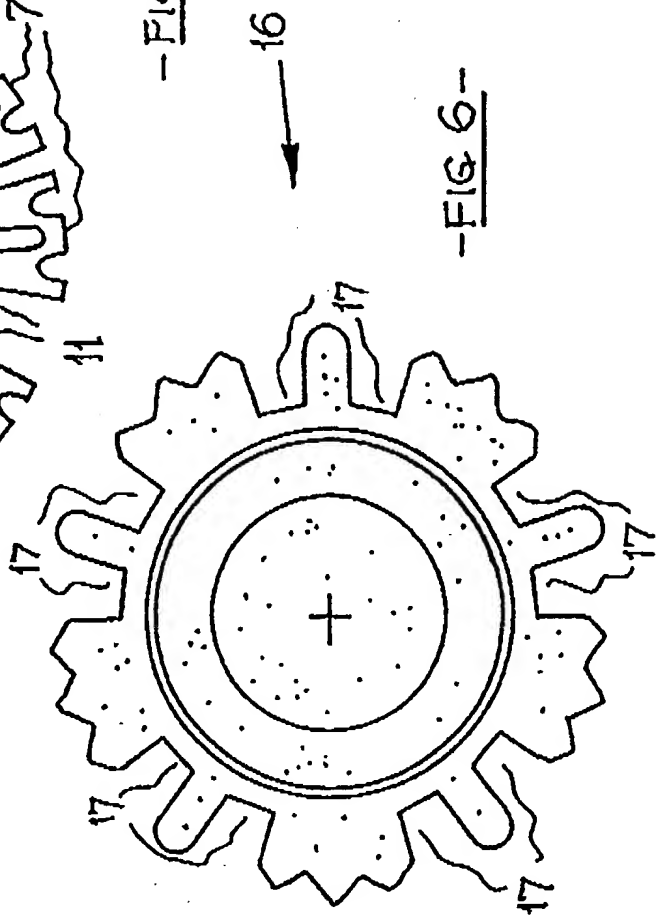
-FIG. 1-



-FIG. 2-

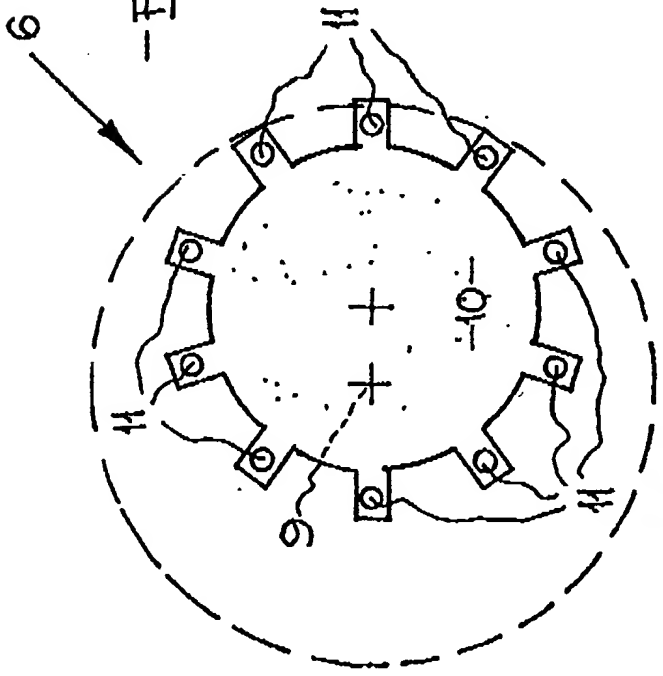


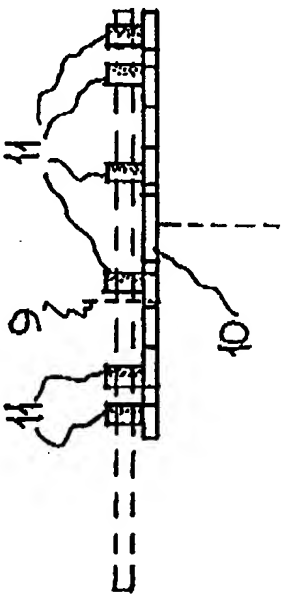
-FIG. 5-



-FIG 6-

-FIG. 3-





-FIG. 4-

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EUROPEAN SEARCH REPORT

Application number

EP 87 85 0055

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	EP-A-0 095 809 (STORK) * Claims 1-3 *	1-3	A 22 C 21/00 B 65 G 47/86
Y	FR-A-2 496 065 (SERAGNOLI) * Whole document *	1-3	
P,A	US-A-4 574 428 (MEYN) * Whole document *	1-3,6	
A	US-A-2 949 996 (TONELLI) * Column 2, lines 14-55 *	4,5	
A	US-A-4 199 288 (GANZ) * Whole document *	1-5	
A	FR-A-2 563 699 (LINCO-FRANCE) * Whole document *	1-3,6	TECHNICAL FIELDS SEARCHED (Int. Cl.4) A 22 C B 65 G A 22 B
A	US-A-4 178 659 (SIMONDS)		
A	US-A-3 643 293 (REJSA)		
A	US-A-3 766 602 (BOTTOMLEY)		

-/-

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27-04-1987	DE LAMEILLIEURE D.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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EUROPEAN SEARCH REPORT

Application number

EP 87 85 0055

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	EP-A-0 155 014 (STORK)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

The present search report has been drawn up for all claims

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THE HAGUE	27-04-1987	DE LAMEILLIEURE D.

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